BY APPOINTMENT TO
HER MAJESTY THE QUEEN
RADIO MANUFACTURERS
ROBERTS RADIO CO LTD

THE ROBERTS RM 40

FM/AM Transistor Mains Radio

4388

Technical Data

SPECIFICATION

SEMICONDUCTORS

18 transistors
3 varicap diodes
5 signal diodes
1 zener diode
1 bridge rectifier

WAVEBAND COVERAGE

MW 185–585 metres (1620–513 kHz)
LW 1140–2000 metres (263–150 kHz)
VHF 87·5–104·5 MHz

POWER SUPPLY

240 volt 50 Hz AC mains only

POWER OUTPUT

5W nominal, continuous sinewave.

LOUDSPEAKER

155×105 mm (6×4 in) elliptical. Nominal impedance 5Ω.

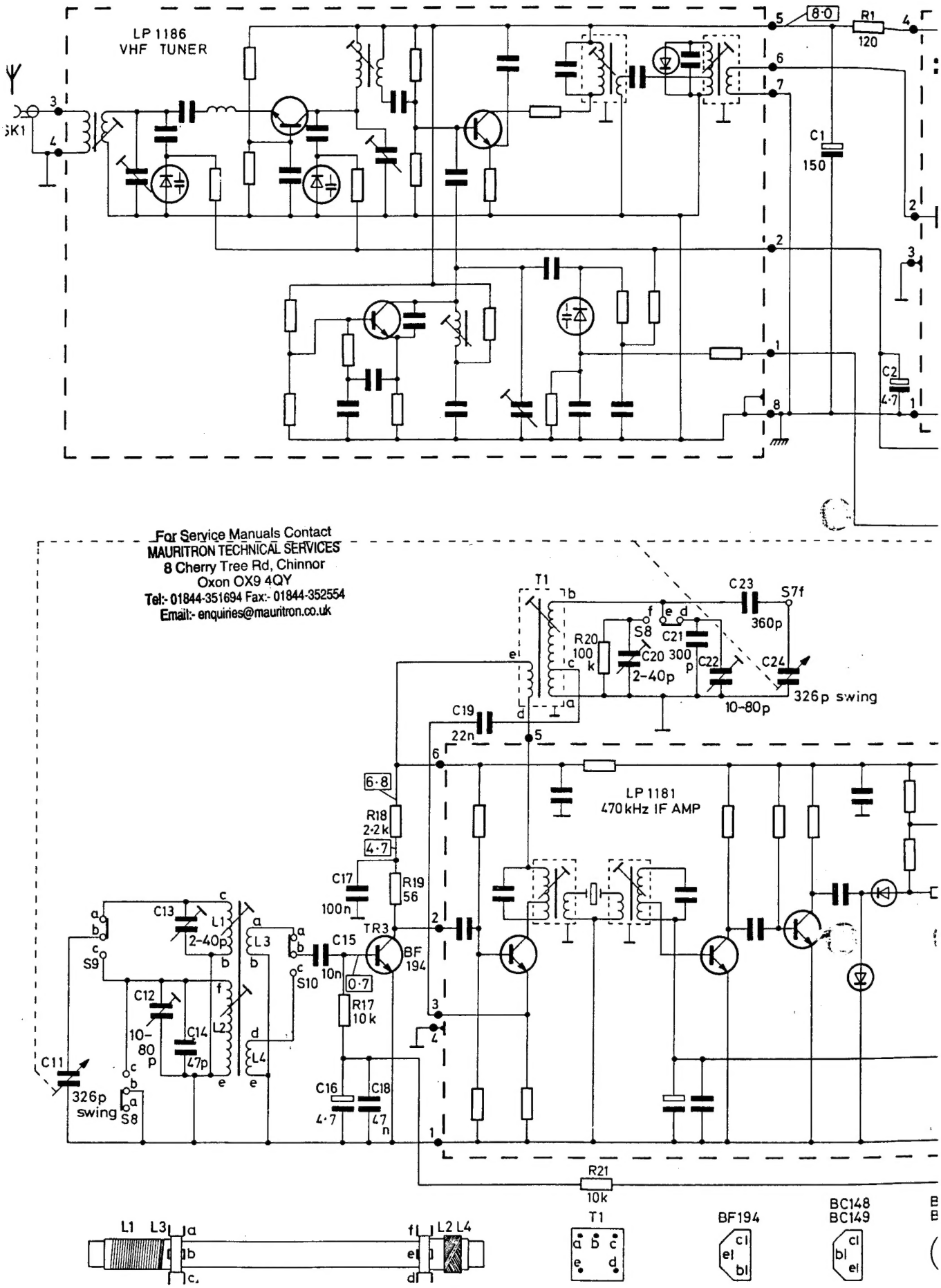
SOCKET FACILITIES

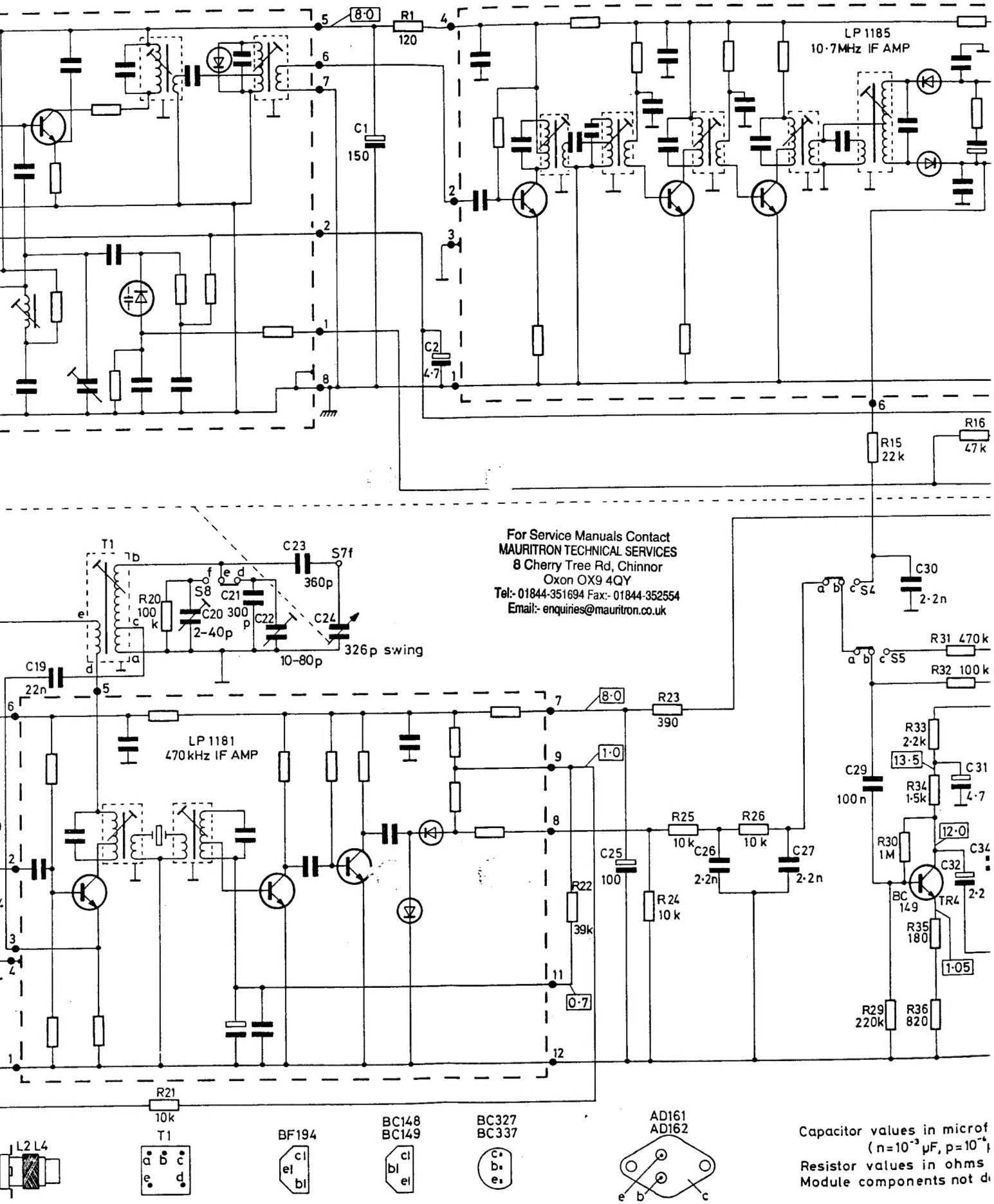
75Ω coaxial socket for VHF aerial.
5 pin 180° DIN socket providing auxiliary input and output facilities.
Aux. input sensitivity—300 mV into 470 kΩ.
Aux. output—100 mV on VHF for limiting input signal deviated 22·5 kHz (taken from ratio detector output via 100 kΩ resistor).

REMOVING CHASSIS FROM CABINET

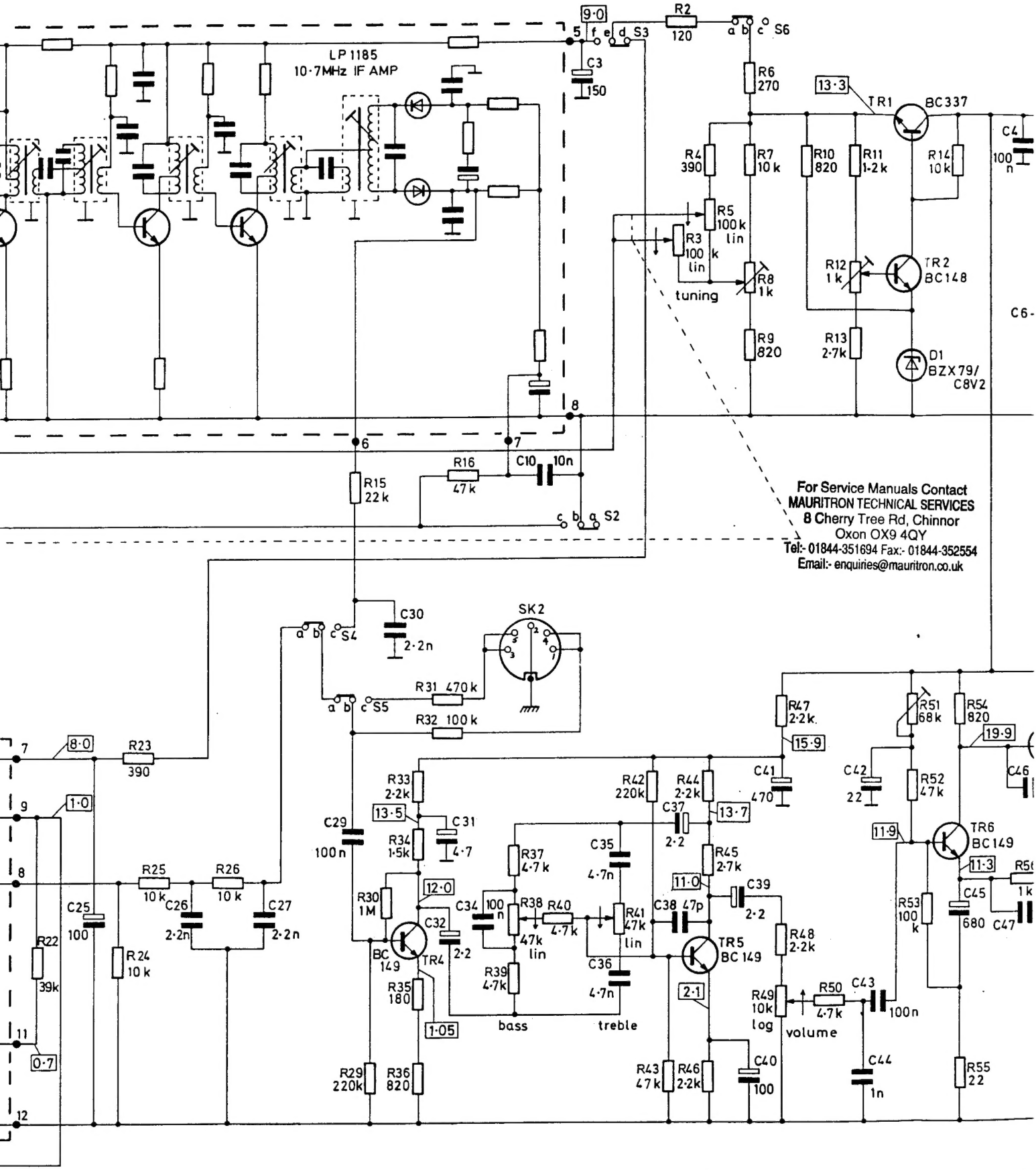
Pull off the Volume, Tuning and Tone control knobs. Remove the single screw in the middle of the cabinet back and slide the back upwards into the slot at the top of the cabinet until the bottom edge is free of the lower slot. Pull the bottom edge of the back out of the cabinet and then slide it free from the top slot. Remove the three countersunk screws from the underside of the cabinet and the single screw at the left-hand side of the chassis. The complete chassis including the mains transformer mounting board may then be removed from the cabinet to the extent of the speaker leads.

CIRCUIT DIAGRAM





Capacitor values in microf
(n=10^{-3} µF, p=10^{-6}
Resistor values in ohms
Module components not d


LP1185
10·7MHz IF AMP
9·0
R2
120
S3
S6
C3
150
R6
270
13·3
TR1
BC337
R4
390
R7
10k
R10
820
R11
1·2k
R14
10k
R5
100k lin
R3
100 k lin
tuning
R8
1k
R12
1k
TR2
BC148
R9
820
R13
2·7k
D1
BZX79/
C8V2
R15
22k
R16
47k
C10
10n
S2
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8 Cherry Tree Rd, Chinnor
Oxon OX9 4QY
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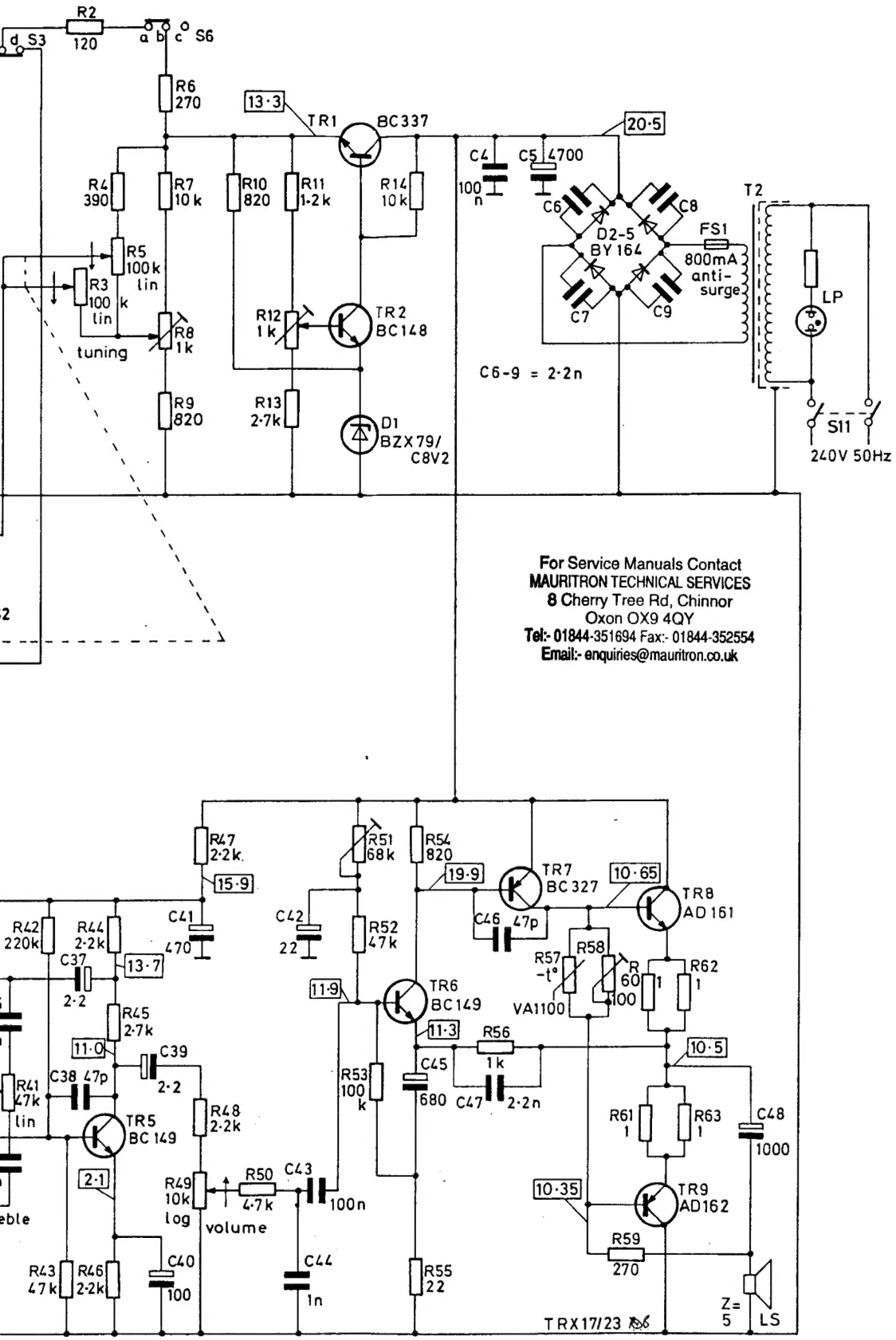
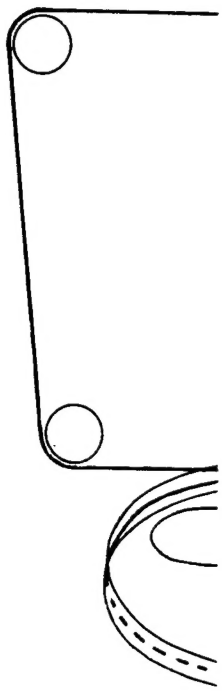
Email:- enquiries@mauritron.co.uk
C30
2·2n
S4
SK2
R31 470k
S5
R32 100k
8·0
R23
390
1·0
R25
10k
R26
10k
C25
100
C26
2·2n
C27
2·2n
R22
39k
R24
10k
0·7
R33
2·2k
13·5
C31
4·7
C29
100n
R34
1·5k
R37
4·7k
C35
4·7n
R30
1M
12·0
C32
2·2
C34
100n
R38
47k lin
R40
4·7k
R41
47k lin
BC
149
TR4
R39
4·7k
C36
4·7n
R35
180
1·05
bass
treble
R29
220k
R36
820
R42
220k
R44
2·2k
C37
2·2
13·7
R45
2·7k
11·0
C38 47p
C39
2·2
TR5
BC 149
2·1
R43
47k
R46
2·2k
C40
100
R47
2·2k
15·9
C41
470
R48
2·2k
R49
10k
log
R50
4·7k
volume
C43
100n
C44
1n
R51
68k
R54
820
19·9
C42
22
R52
47k
11·9
TR6
BC 149
11·3
R53
100
k
C45
680
C47
1k
R55
22
C46
C4
100
n
C6-
AD161
AD162
e b c
Capacitor values in microfarads
(n=10⁻³ μF, p=10⁻⁶ μF)
Resistor values in ohms
Module components not designated
Voltages measured with respect to -ve su
DC voltages shown thus 20·5
Arrows on pot'meters show clockwise rotation



Voltages measured with respect to -ve supply
DC voltages shown thus 20·5

Arrows on pot'meters show clockwise rotation of slider

CORD DRIVE



CIRCUIT DESC

Low voltage AC from t
smoothed by the bridge
capacitor C5. This DC
amplifier section of the
transistor TR1 which is
and controlled by TR2
voltage for the VHF tun
and IF sections of the r

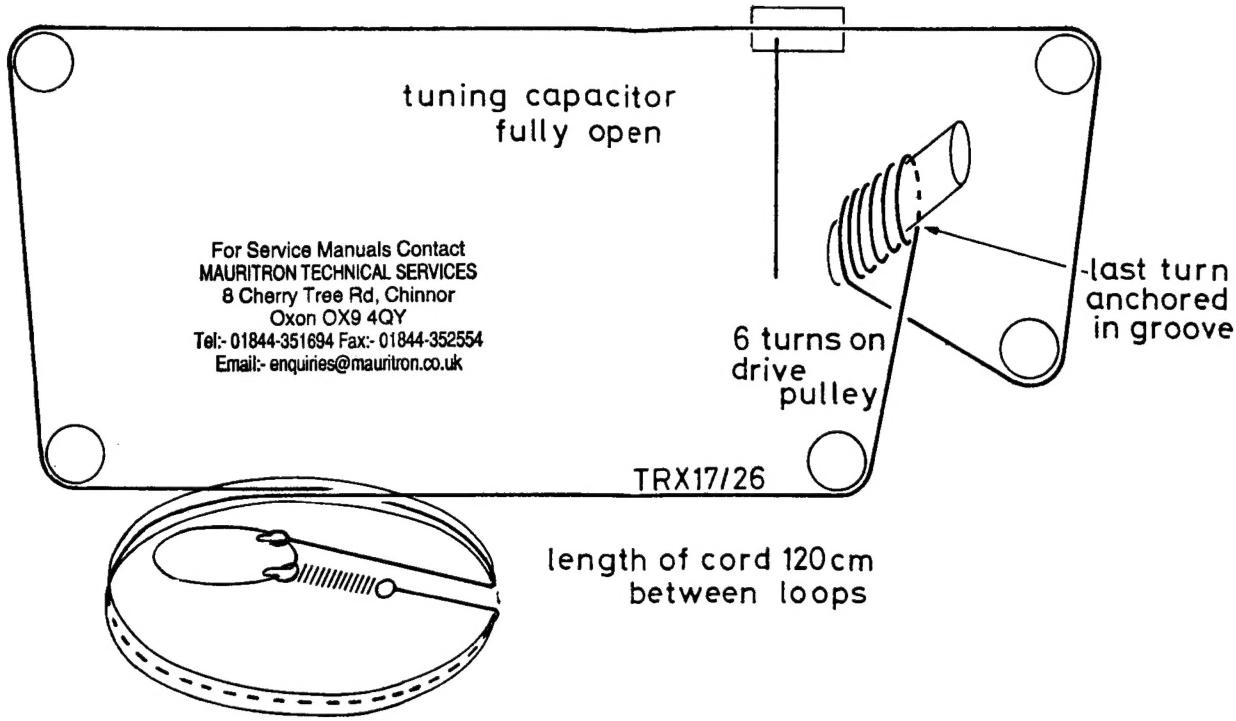
On VHF, a variable pote
mechanically coupled t
provide a variable volta
module LP1186. Three
used to tune the aerial,
means of the voltage th

An output from the tun
amplifier LP1185. The a
fed, after de-emphasis
amplifier input. A DC v
detector output is fed b
tuning diode to provide

On MW/LW, signals fro
C11 are fed to the base
taken to the input of th
transistor in this module
conjunction with T1 an
is fed via a ceramic resc
further amplifying transi
voltage derived from th
to provide AGC. This vo
of TR3 via R21 and R1
After filtering to remove
is fed via S4 and S5 to

The output from the au
active tone control stag
taken to the volume co
audio amplifier consists
driver TR7 feeding a cla
output pair TR8 and TR
quiescent current are se
respectively.

CORD DRIVE DIAGRAM



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CIRCUIT DESCRIPTION

Low voltage AC from the secondary of T2 is rectified and smoothed by the bridge rectifier D2-5 and the smoothing capacitor C5. This DC voltage supplies the audio amplifier section of the receiver. A series regulator transistor TR1 which is stabilised by a zener diode D1 and controlled by TR2 provides a stabilised, regulated voltage for the VHF tuning voltage and to power the RF and IF sections of the receiver.

On VHF, a variable potentiometer R3 and R5, mechanically coupled to the tuning control is used to provide a variable voltage necessary to tune the VHF module LP1186. Three varicap diodes in the tuner are used to tune the aerial, RF and oscillator circuits by means of the voltage thus derived.

An output from the tuner at 10·7 MHz is fed to the IF amplifier LP1185. The audio output from this module is fed, after de-emphasis by R15 and C30, to the audio amplifier input. A DC voltage derived from the ratio detector output is fed back via R16 to the oscillator tuning diode to provide AFC.

On MW/LW, signals from the tuned circuit L1/L2 and C11 are fed to the base of TR3. The output from TR3 is taken to the input of the LP1181 AM module. The first transistor in this module acts as an oscillator-mixer in conjunction with T1 and C24 and an output at 470 kHz is fed via a ceramic resonator providing selectivity to further amplifying transistors and a demodulator. A DC voltage derived from the demodulator is fed back via R22 to provide AGC. This voltage is also applied to the base of TR3 via R21 and R17 to supplement the AGC action. After filtering to remove unwanted RF, the audio output is fed via S4 and S5 to the audio amplifier input.

The output from the audio preamplifier TR4 feeds an active tone control stage TR5, the output of which is taken to the volume control R49. The direct-coupled audio amplifier consists of an amplifying stage TR6 and a driver TR7 feeding a class B, complementary push-pull output pair TR8 and TR9. Output stage balance and quiescent current are set up by means of R51 and R60 respectively.

SERVICING

GENERAL

Voltages shown on the circuit diagram are positive with respect to chassis with a 240 volt mains supply, no signal input and volume at minimum.
Do not forget the mica insulating washers when replacing TR8 and TR9.
Calibration marks are provided on the scale at 1923 and 1145 metres. When feeding in signals, the input should be kept as low as possible to prevent AGC action masking the alignment peaks.

MODULES

The three modules LP1181, LP1185 and LP1186 are prealigned in the factory and, since specialised equipment is required for this purpose, no instructions are given. In the event of any fault, remove the complete module and return to Roberts Radio for replacement.

TUNING POTENTIOMETER R3/R5

This potentiometer has tracks specifically made for this purpose and an ordinary linear track potentiometer such as used for stereo amplifiers will NOT be a replacement. Be[illegible]se of this the following setting-up procedure should b[illegible]owed exactly.

CORD DRIVE

Turn the large, plastic drive drum on the tuning potentiometer fully anticlockwise. Turn the tuning spindle fully clockwise so that the gang vanes are fully open. Tighten the grub screw on the brass drive pulley so that the grub screw is in the '10 o'clock' position looking from the front. String up the cord drive as shown in the diagram starting with the end of the cord not attached to the spring. Do not use thicker cord than that which is supplied. Set the pointer carriage on the cord (do not seal yet) so that the pointer lies over the number 15 on the VHF channel scale. Loosen the drive pulley grub screw. Advance the plastic drive drum clockwise with fingers until the pointer rests over the two white dots at the left-hand end of the tuning scale. Ensuring that the tuning spindle is still fully clockwise, retighten the grub screw. Slide the pointer along to the right-hand end of the tuning scale and turn the tuning spindle until the gang vanes are full meshed. Reset the pointer to coincide with the white dots and seal the pointer carriage to the cord with a dab of glue or paint.

RESISTORS

R1 120Ω ±10% 0.5W Carbon composition
R2 120Ω ±10% 0.5W Carbon composition
R3 100kΩ linear potentiometer ganged with R5
R4 390Ω ±10% 0.5W carbon composition
R5 100kΩ linear potentiometer ganged with R3
R6 270Ω ±10% 0.5W carbon composition
R7 10kΩ ±10% 0.5W carbon composition
R8 1kΩ preset potentiometer
R9 820Ω ±10% 0.5W carbon composition
R10 820Ω ±10% 0.5W carbon composition
R11 1.2kΩ ±10% 0.5W carbon composition
R12 1kΩ preset potentiometer
R13 2.7kΩ ±10% 0.5W carbon composition
R14 10kΩ ±10% 0.5W carbon composition
R15 22kΩ ±10% 0.5W carbon composition
R16 47kΩ ±10% 0.5W carbon composition
R17 10kΩ ±5% 0.33W carbon film
R18 2.2kΩ ±5% 0.33W carbon film
R19 56Ω ±5% 0.33W carbon film
R20 100kΩ ±10% 0.5W carbon composition
R21 10kΩ ±10% 0.5W carbon composition
R22 39kΩ ±10% 0.5W carbon composition
R23 390Ω ±10% 0.5W carbon composition
R24 10kΩ ±10% 0.5W carbon composition
R25 10kΩ ±5% 0.33W carbon film
R26 10kΩ ±10% 0.5W carbon composition
R29 220kΩ ±5% 0.33W carbon film
R30 1MΩ ±5% 0.33W carbon film
R31 470kΩ ±5% 0.33W carbon film
R32 100kΩ ±5% 0.33W carbon film
R33 2.2kΩ ±5% 0.33W carbon film
R34 1.5kΩ ±5% 0.33W carbon film
R35 180Ω ±5% 0.33W carbon film
R36 820 ±5% 0.33W carbon film
R37 4.7kΩ ±10% 0.5W carbon composition
R38 47kΩ linear potentiometer
R39 4.7kΩ ±10% 0.5W carbon composition
R40 4.7kΩ ±10% 0.5W carbon composition
R41 47kΩ linear potentiometer
R42 220kΩ ±5% 0.33W carbon film
R43 47kΩ ±10% 0.5W carbon composition
R44 2.2kΩ ±10% 0.5W carbon composition
R45 2.7kΩ ±10% 0.5W carbon composition
R46 2.2kΩ ±10% 0.5W carbon composition
R47 2.2kΩ ±10% 0.5W carbon composition
R48 2.2kΩ ±10% 0.5W carbon composition
R49 10kΩ log. potentiometer
R50 4.7kΩ ±10% 0.5W carbon composition
R51 68kΩ preset potentiometer
R52 47kΩ ±10% 0.5W carbon composition
R53 100kΩ ±10% 0.5W carbon composition
R54 820Ω ±10% 0.5W carbon composition
R55 22Ω ±10% 0.5W carbon composition
R56 1kΩ ±10% 0.5W carbon composition
R57 VA1100 thermistor
R58 100Ω preset potentiometer
R59 270Ω ±10% 0.5W carbon composition
R60 1Ω ±5% 0.33W carbon film
R61 1Ω ±5% 0.33W carbon film
R62 1Ω ±5% 0.33W carbon film
R63 1Ω ±5% 0.33W carbon film

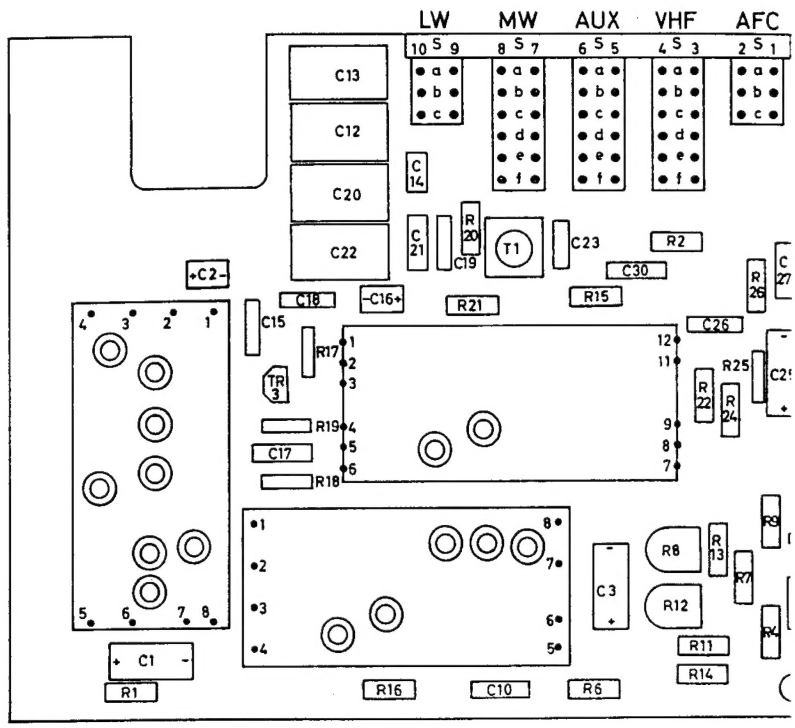
CAPACITORS

C1 150µF 16V electrolytic
C2 4.7µF 63V electrolytic
C3 150µF 16V electrolytic
C4 100nF 250V met. polyester film
C5 4700µF 25V electrolytic
C6 2.2nF 500V disc ceramic
C7 2.2nF 500V disc ceramic
C8 2.2nF 500V disc ceramic
C9 2.2nF 500V disc ceramic
C10 10nF 250V met. polyester film
C11 326pF gang capacitor (variable)
C12 10-80pF preset capacitor
C13 2-40pF preset capacitor
C14 47pF ±10% 125V polystyrene
C15 10nF 250V met. polyester film
C16 4.7µF 63V electrolytic
C17 100nF 250V met. polyester film
C18 47nF 250V met. polyester film
C19 22nF 250V met. polyester film
C20 2-40pF preset capacitor
C21 300pF ±2.5% 350V polystyrene
C22 10-80pF preset capacitor
C23 360pF ±2.5% 125V polystyrene
C24 326pF gang capacitor (variable)
C25 100µF 10V electrolytic
C26 2.2nF 630V polyester film/foil
C27 2.2nF 630V polyester film/foil
C29 100nF 250V met. polyester film
C30 2.2nF 630V polyester film/foil
C31 4.7µF 63V electrolytic
C32 2.2µF 63V electrolytic
C34 100nF 250V met. polyester film
C35 4.7nF 400V polyester film/foil
C36 4.7nF 400V polyester film/foil
C37 2.2µF 63V electrolytic
C38 47pF ±10% disc ceramic
C39 2.2µF 63V electrolytic
C40 100µF 10V electrolytic
C41 470µF 25V electrolytic
C42 22µF 25V electrolytic
C43 100nF 250V met. polyester film
C44 1nF ±20% disc ceramic
C45 680µF 16V electrolytic
C46 47pF ±10% disc ceramic
C47 2.2nF 630V polyester film/foil
C48 1000µF 25V electrolytic

MISCELLANEOUS

T1 Oscillator coil
T2 Mains transformer
FS1 800mA anti-surge fuse
LP Neon indicator

BOARD LAYOUT (TOP)



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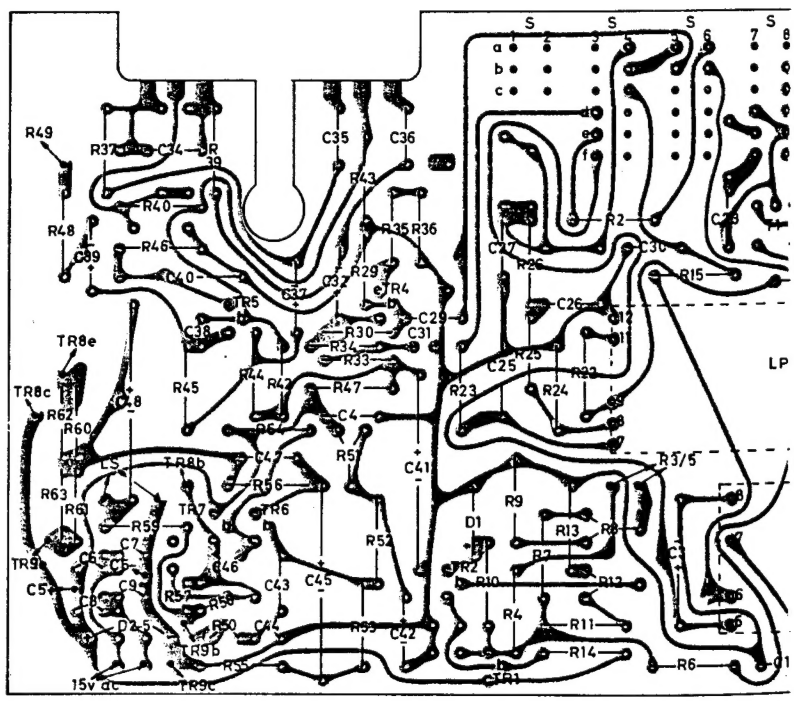
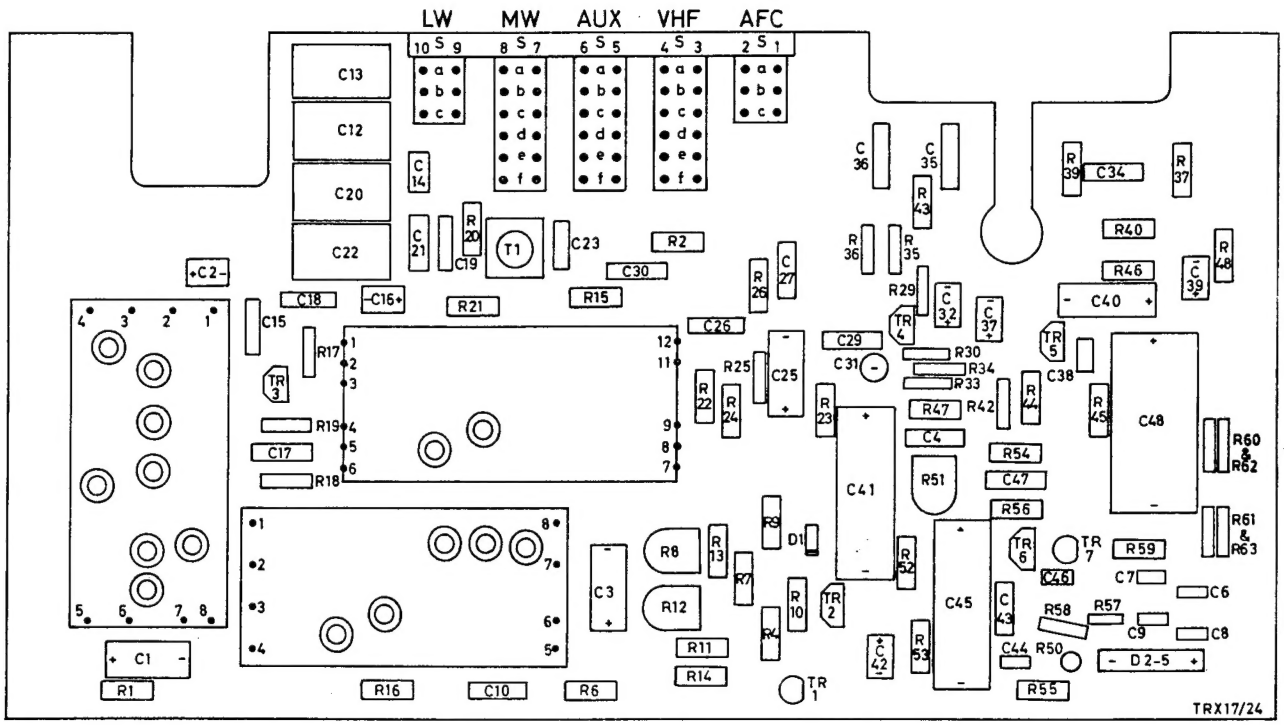
BOARD LAYOUT (UNDERSIDE)



BOARD LAYOUT (TOP)



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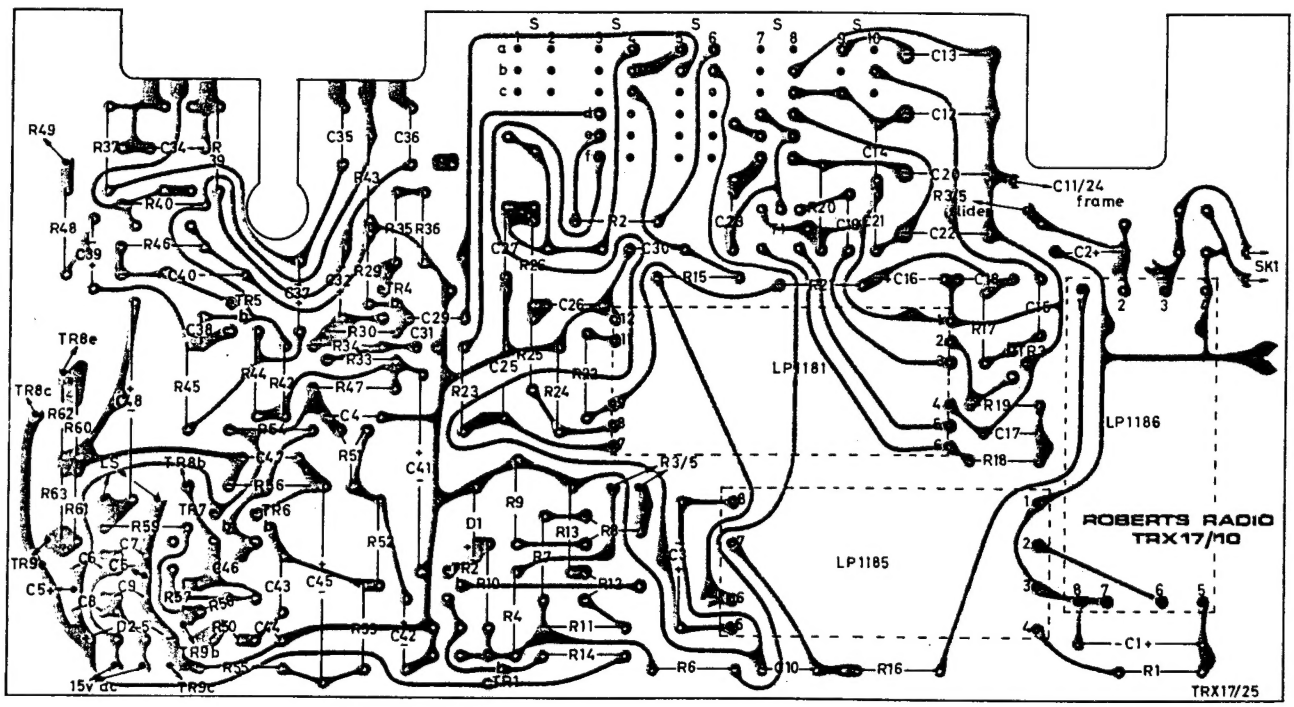

ALIGNMENT

	Sequence of Alignment	Adjust-ment	Test Conditions	Indication
1	Output stage balance	R51	Voltage between junction R56/C48 and chassis	10·5V
2	Output stage quiescent current	R58	Milliammeter in series with TR9 collector	15mA after 1 min. @ 20°C
3	Output stage dynamic balance	R51	1 kHz sine wave input at SK2 (pin 3); press AUX button; oscilloscope across LS	Symmetry at onset of clipping
	Ensure pointer alignment is correct before proceeding (see 'cord drive' above)			
4	Tuning voltage	R12	Tuning control fully clockwise; High impedance voltmeter (not less than 10MΩ) between R3/5 slider and chassis	12·0V
5	Tuning voltage	R8	As 4; tuning control fully anti-clockwise	2·0V
	If no high impedance voltmeter is available see note below			
6	MW	C20 & C13	Feed in 1500 kHz (mod. 30%) via coupling coil; connect output meter across LS; set pointer to right-hand (1145) calibration mark.	Adjust for max. deflection of output meter.
7	MW	T1 & L1	As 6, feeding in 560 kHz and set pointer to left-hand (1923) calibration mark	As 6
	Repeat 6 & 7 for optimum results finishing with 6			
8	LW	C22 & C12	As 6, feeding in 262 kHz and set pointer to right-hand calibration mark	As 6
9	LW	L2	As 6, feeding in 156 kHz and set pointer to left-hand calibration mark	As 6
	Repeat 8 & 9 for optimum results finishing with 8			

NOTE

The tuning voltage may be roughly set up using an AVO 8 by setting the voltages to 11·9V (on the 25V range) and 1·8V (on the 2·5V range) respectively.

CHASSIS LAYOUT